

# HOW DO DIFFERING STANDARDS INCREASE TRADE COSTS?

## THE CASE OF PALLETS

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### Abstract

The pallet is a platform used for storing, handling, and transporting products. There are hundreds of different pallet sizes around the world. The case of pallets is examined to illustrate the impact of multiplicity of standards on trade costs. We select this case because pallets are used all around the world, pallet standards are not too sophisticated, and data on the impact of pallet standards are to some extent available. The paper examines why there are so many different pallet sizes, the associated trade costs and the reasons why countries have not harmonized pallet sizes to eliminate such costs. It then presents options for exporters to mitigate the adverse effects of standards multiplicity while complying with destination markets' standard requirements. The range of options is limited in the case of exporters from less developed countries because of the lack of rental and exchange pallet markets. To mitigate the costs of this multiplicity of standards, the World Bank's strategy should be divided in two directions: to develop awareness of costs related to the multiplicity of standards and to support actively harmonization at the global level (within International Organization for Standardization) and at the regional level (within regional cooperation agreements).

*Keywords:* standards, trade costs, pallets.

World Bank Policy Research Working Paper 3519, February 2005

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## Introduction

The pallet is a portable, horizontal, rigid platform used as a base for storing, stacking, handling, and transporting goods as a unit load (National Wooden Pallet and Container Association 2004) (see Figure 1).

Fig. 1: A pallet



The pallet case is an interesting one because of the multiplicity of pallet sizes and the extensive use of pallets in the world. “Pallets move the world” (White 2000:1): 80 percent of US trade is carried on pallets. Each year, around 280 million of pallets circulate in the EU.

The pallet is considered as one of the two key innovations of the twentieth century for material handling (Le Blanc 2002:1). The pallet was first used in the 1930s in the United States. During the war in the Pacific, the US Army developed considerably pallet utilization to improve the efficiency of material handling. Pallet use spread rapidly to the rest of the world. Today, the pallet is used in a vast majority of countries. Its use has developed dramatically for three main reasons: it protects the product, it improves storage and it makes distribution more efficient.

As transport companies in other countries adopted the pallet, many employed pallets with different sizes and composition. There are hundreds of different pallet sizes in the world. The paper focuses only on the multiplicity of pallet product standards that are mainly determined by pallet size<sup>1</sup>.

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<sup>1</sup> The paper does not address phytosanitary and environmental standards, where there is a lower degree of multiplicity.

The main finding of this paper is that the multiplicity of standards increases countries' trade costs and poses a particular challenge for least developed countries (LDCs). The multiplicity of pallet sizes increases trade costs because products must be manually unloaded from their pallets at the border and reloaded on a pallet with the standards of the destination country. The multiplicity of pallet sizes poses a particular challenge for LDCs because the lack of rental and exchange pallet markets limit LDCs' ability to comply with differing pallet size standards in destination markets. The low value added of the products carried on pallets from LDCs makes their exporting firms more sensitive to the increases in trade costs resulting from the multiplicity of pallet sizes.

The paper is structured as follows: the first section assesses the extent of standards multiplicity of pallet sizes and its trade costs; the second section examines how LDCs are affected by the multiplicity of pallet sizes; the third section concludes and derives policy implications.

## **1. The Multiplicity of Pallet Standards in the World**

This section starts by reviewing the prevalence of the multiplicity of pallet sizes across countries and the reasons for the failures to harmonize pallet sizes. It then examines the implications of the multiplicity in terms of trade costs and finally demonstrates that multiplicity can spread to other links of the logistics chain.

### **1.1 The “Tragedy of the Commons” for the Multiplicity of Pallet Standards**

The multiplicity of pallet standards derives from the fact that pallet manufacturers have gradually increased the number of pallet sizes used across the world because the current trend is the creation of a new pallet size for a new type of product. US companies use today over 400 different pallet sizes (Brindley 2002:1). The cost of pallet management has gradually increased with the addition of pallet sizes.

The proliferation of pallet sizes across the world has taken place in spite of the fact that pallet size multiplicity reduces the efficiency of distribution for which pallets were initially created. Such paradoxical behavior is known in the game theory literature as the

“tragedy of the commons”: companies end up consuming the public good in a manner that leaves them worse off than if those companies had taken into account the repercussions of their actions on the other consumers and had cooperated with them in deciding how to consume the public good. Standards are a public good because their costs and benefits affect more than just the consumer of that good. In the absence of cooperation, when the importer firm (or transport company)<sup>2</sup> in one country selects which type of pallet to use, it does not take into account the repercussions of its action on exporters in other countries. The importer (or the transport company) of each country simply selects the pallet that has the best-suited characteristics for the type of product that it imports or transports.

## **1.2 The Failures of the Harmonization of Pallet Standards**

Having set different pallet standards and realized that these differences were reducing the cost-saving features of the pallets, why is it that transport companies, importers and exporters do not use the same harmonized pallet standard? The behavior of the three types of actors in dealing with multiplicity of standards resembles what economists call the prisoner’s dilemma. If importers (or exporters) in one country were to change their pallet standard for an international standard but the rest of the world did not, it would incur all the cost of having to replace all its pallets for pallets with international standards but would not see any benefit. Indeed, the goods on international pallets would still have to be depalletized and repalletized to the pallet standard of the destination country. Nevertheless, if all countries would change their pallets to the international standard there would be no need to depalletize and repalletize, saving labor and time resources that could be devoted to transporting the increase in trade, which would result from the removal of these distortions.

To illustrate the main hurdles for harmonization, the recent Australian initiative is instructive. In 2001, the Australian Department of Transport commissioned a report to assess the logistical and financial impact of abandoning the Australian pallet standard

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<sup>2</sup> The exporter can also be responsible for the selection of the pallet. However, in most cases, pallet requirements are set from the retailer or the importer. The transport company may also prefer some pallets

(1165 mm \* 1165 mm) for the 1200 mm \* 1000 mm pallet. The study found that replacing the Australian pallet size has a positive net present value of 2.5 billion USD. Australia's replacement costs in the long run would not be as large as that of countries with a more diversified market because two thirds of Australia's total trade takes place with countries that use the 1200 mm \* 1000 mm pallet or the US equivalent.<sup>3</sup> However, so far, Australia has not abandoned its pallet standard probably because of the short-term replacement costs and the hypothetical aspect of the benefits. Australia would have to spend 600 million USD for capital expenditures for adjustments to the pallet pool, racking and ancillary equipment over 10 years. Over the same period, operating costs would increase by 100 million USD (Aus DOTARS 2001).

International cooperation is needed for countries to accept an international pallet size. However, as the case of the ISO reflects, designing the appropriate type of cooperation to achieve harmonization of pallet sizes is no easy task. In the last decade, the International Organization for Standardization (ISO)<sup>4</sup> strived to rationalize pallet sizes. However, the ISO conceded and agreed to a second-best solution: "to promote distribution efficiency through the use of a *limited* number of internationally recognized and approved pallet sizes that most countries can adopt" (ISO 6780 2003: page V).

The ISO was unable to adopt a universal pallet size. No region seemed ready to adopt one universal standard. The three main trading regions (North America, EU, Japan and China), which have three predominant different pallet sizes, promoted their own standard because they did not want to bear the cost of replacing their pallets stocks. Eventually, six sizes<sup>5</sup> have been listed in the ISO standard<sup>6</sup> for pallet sizes and features. This is not an

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standards to limit the rejection problems in the destination's country.

<sup>3</sup> The USA 48 \*40 inches is just a bit larger than the 1200 mm x 1000mm size and may be interchangeable in many handling environments.

<sup>4</sup> Pallet sizes are not the only field in which ISO has tackled pallet standards. Within the Technical Committee on Pallets for Unit Load Method of Materials Handling (ISO/TC 51), more than 10 standards have been discussed in the last decade like the quality of sawn wood used for the construction of pallets, the performance requirements, and the working load.

<sup>5</sup> The sizes, in mm, are: 1200 x 800, 1200 x 1000, 1140 x 1140 (used mainly in Europe), 1219 x 1016, 1067 x 1067 (used mainly in the USA) and 1100 x 1100 (used mainly in the Pacific rim).

<sup>6</sup> The ISO standard is ISO 6780:2003 on "Flat pallets for intercontinental materials handling -- Principal dimensions and tolerances". The adoption dates back to 2003.

ideal solution. When the draft standard was being discussed, White already warned: “there are six international pallet sizes in the draft standard and that is five too many” (Brindley 2002a:5).

### **1.3 The Negative Impact of the Multiplicity of Pallet Standards on Trade Costs**

The multiplicity of pallet sizes increases trade costs because goods have to be depalletized<sup>7</sup> and repalletized resulting from differences in pallet sizes. The additional handling operations increase delivery time and cost. The cost of different pallet standards can even be more dramatic when products loaded on one pallet cannot be imported because of the incompatibility of the handling machinery or because the pallet does not satisfy the requirements of the destination country.

Differing standards increase trade costs because of high compliance costs to satisfy standards in several destination markets. In the case of pallets, standardization is justified by two main reasons. First, by eliminating the manual transfer of goods to another pallet, productivity and work efficiency are improved and the need for sorting pallets eliminated. Standardization of pallet sizes will allow standardization of palletizers<sup>8</sup>, racking and warehouse design. This will result in economy of space and facilitate automation. Secondly, by limiting manual handling, product losses are reduced and the wastage of pallets minimized.

AT Kearney, in a study on the efficiency of unit loads of transport (such as pallets and boxes) finds that current pallet heights make poor use of vehicle inner heights and as a result, 15% additional grocery trucks are required in Europe (Penman 1997:6)<sup>9</sup>.

Vantine and Marra (1997:61) argue that the technical differences between the standards of Argentina and Brazil make pallet exchanges impossible and have seriously impeded MERCOSUR’s transport integration, increasing transport costs across countries.

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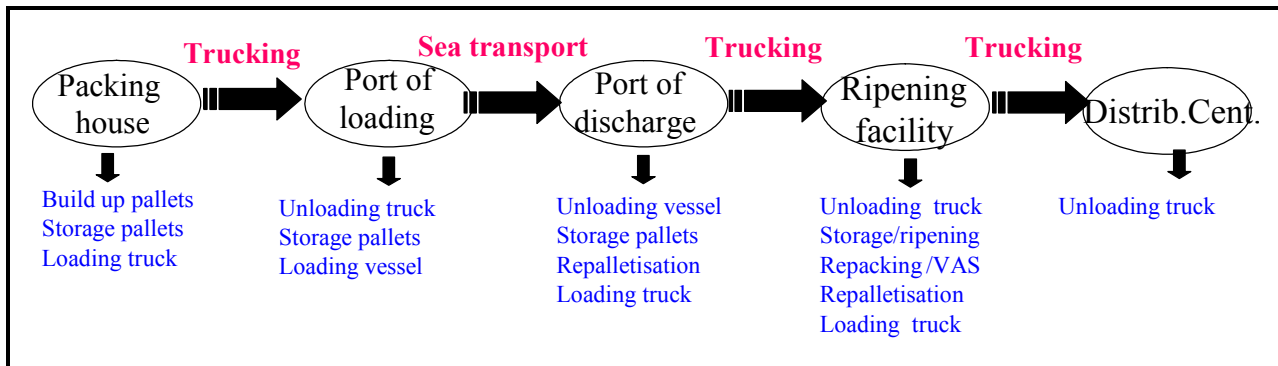
<sup>7</sup> The action to take goods from one pallet (depalletize) and transfer it to another pallet (repalletize).

<sup>8</sup> Equipment in warehouses that moves cartons and pallets. Palletizers can be robotized in order to increase the efficiency of warehouses.

<sup>9</sup> Truck loading is constrained by overload limits in some cases.

To illustrate the increase in trade costs caused by the multiplicity of pallet sizes, we present data from a case study of a lower middle-income economy, Ecuador. Veenstra et al. (2000) study the cost of the lack of pallet size standardization. They conducted a detailed study for banana exports from Ecuador to Europe. Veenstra et al. (2000) find that banana cartons exported to continental Europe (the Netherlands excluded) have to be repalletized from a 1200\*1000 pallet to a 1200\*800 Europallet at the port of discharge. The latter pallet is the pallet size almost exclusively accepted in the European market (for the whole chain, see Figure 2).

**Figure 2: The Banana Chain from Ecuador to Europe**



Source : Veenstra et al. (2000).

Note: the second repalletization is generally a retailer's policy.

They first examine the inefficiencies linked to the lack of standardization and then estimate their cost. In Table 1, a combined scenario is compared to the benchmark case of a harmonized ISO pallet chain. The three inefficiencies identified concern pallet material, handling and equipment:

1. Pallet material: the Europallet is the smallest ISO size, which means more Europallets are needed to transport the same number of cartons (inefficiency of space and additional pallets required),
2. Handling: pallets have to be handled on several occasions (see Figure 2),

3. Repalletization: bananas on large pallets have to be put on smaller pallets because of this lack of standardization (scenario 3).

**Table 1: Transport, Handling and Pallet Costs of the Banana Chain from Ecuador to Europe**  
(in USD per carton)

	<b>Benchmark: ISO chain</b>	<b>Combined Chain: ISO pallet repalletized to an EURO pallet</b>
<b>Inefficiency 1: Cost of pallets</b>	<b>0.36</b>	<b>0.76</b>
<b>Inefficiency 2: transport, handling &amp; storage</b>		
Cost from packing house in Ecuador to European port	2.41	2.41
Cold storage and handling port of discharge	0.47	0.52
Transport to ripening facility and handling	1.33	1.49
Transport from ripening facility and handling to the client	0.25	0.31
<b>Total cost of transport, handling and storage</b>	<b>4.46</b>	<b>4.72</b>
<b>Inefficiency 3: Repalletization from ISO to EURO pallet at the port of discharge</b>	<b>NA</b>	<b>0.33</b>
<b>Total transport costs (price of pallet, handling, transport, repalletization &amp; storage)</b>	<b>4.82</b>	<b>5.82</b>

Source: Veenstra et al. (2000) adapted from authors. All costs per carton in USD. ISO chain is the transport chain that uses an ISO pallet 1200\*1000 which is the pallet size used mainly in the UK and the Netherlands.

The study concludes that having two different pallet sizes results in a total inefficiency that leads to an additional dollar per carton, which equals 21% total transport costs per carton of bananas exported from Ecuador to Europe (see Table 2). This increase is due to an increase in the cost of pallets of \$0.40, an increase in transport, handling and storage costs of \$0.26 and the additional handling costs of repalletizing cartons from a 1200 mm \* 1000 mm pallet to a 1200 mm \* 800 mm Europallet that adds \$0.33 per carton of bananas exported from Ecuador to Europe. As the case of bananas shows, the multiplicity of pallet sizes increases trade costs significantly – 21% in the case of Ecuadorian bananas. In the case of banana exports from Ecuador to the EU, the combined chain inefficiency would increase logistics costs by 27 million annually<sup>10</sup>.

<sup>10</sup> In 2000, Ecuador exported 3.993 million tons. Out of this volume, 17% is exported to the EU or 678975 tonnes. Containers are loaded with 14.9 tonnes of bananas (20 pallets of 30 55-pound boxes). Consequently, Ecuador exports annually 45358 containers. If we assume that all bananas are exported through a combined pallet chain, the inefficient pallet costs are 1 USD per box. Therefore, the pallets costs linked to pallets inefficiencies are equal to 600 USD per container (600 boxes) or 27 million for the annual exported volumes to the EU.

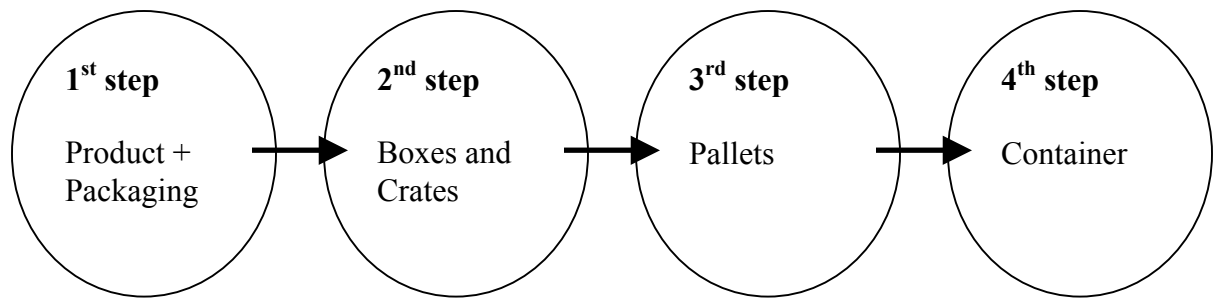


### 1.4 The Spread of the Multiplicity of Pallet Standards

When there is a multiplicity of standards in one link of the logistics chain, such multiplicity can spread to other links of the logistics chain, increasing the inefficiency in the market. Each player optimizes his part often to the detriment of the “total chain” efficiency.

The transport chain can be characterized as having four links. The first link consists of packaging the product. Secondly, the products are placed in a box or crate. Thirdly, the box or crate is placed on a pallet. Finally, the pallet is placed in a container (see Figure 3).

**Figure 3: Links in the Transport Chain**



The multiplicity of pallet standards allows firms greater flexibility in designing box sizes, since the greater range of pallet sizes allows for a greater range of box sizes. Indeed, boxes and crates sizes are driven by the primary product size and available pallet sizes. The multiplicity of pallet sizes enables what AT Kearney called “the burgeoning proliferation and complexity” of box and crate sizes.

The multiplicity of pallet standards could also lead to the multiplicity of container standards in the near future. The ISO containers, which are widely used in Europe, have the US standard length unit (20’ and 40’). However, the Europallet, the pallet commonly used in continental Europe, is a metric measure that fits badly in US-measured

containers. Complaining about the lack of standardization for loading units, the European Commission, in April 2003 proposed a directive draft on an “Eurocontainer” (called the EILU, European Intermodal Loading Unit). The European Commission wishes to introduce an “Eurocontainer” in which Europallets would fit well. The European Commission calculated that the introduction of EILU would reduce transported containers by 26% in the EU. However, with a container 1.2 meter longer than the US 20’, the introduction of the Eurocontainer would probably impact the market. The EU assumes that operators will agree to exchange empty containers (EILU or not). However, this is not certain. The greater size of the container will most probably disturb stacking the containers of different types. This proposal is not consistent with the European Commission’s complaint about the lack of standardization for loading units, since it would induce standard multiplicity in the field where standardization is the most widespread worldwide – i.e. containers. The EU is attempting to lessen the inefficiencies caused by the multiplicity of standards by creating an inefficiency in a different link of the logistics chain: the container. Having different sizes in containers is likely to cause uncertainty and greater distribution costs.

## **2. The Multiplicity of Standards, a Particular Challenge for LDCs**

We now proceed to examine how the multiplicity of pallet sizes impacts LDCs. LDCs also face depalletizing and repalletizing costs. The example of Ecuadorian bananas can be extended for instance to Haitian or Uganda’s banana exports. However, LDCs are faced with two particular challenges: they have fewer solutions open to minimize the impact of the multiplicity of pallet sizes and they are significantly affected by the resulting increased trade costs due to the low value added content of their palletized products.

### **2.1 The Costly Solutions for Exporters from LDCs**

In LDCs, the wide spectrum of solutions available in the North is not present. The private sector in the North has lessened the costs of the multiplicity of standards through

different options. In North America and in Europe, four options<sup>11</sup> are available for a company handling the pallet issue (Lacefield 2004:1). First, the seller can ship goods with a limited-use pallet (a softwood pallet). Shippers use frequently this technique because pallet costs are the lowest. However, this turns out to be costly per number of trip (see Table 2 for details). Secondly, the seller can use the pallet rental market. Even though the rental market accounts for only 10% of the pallet market, the leader on the market<sup>12</sup> achieves 2 million of pallet movement per day, is present in 38 countries and serves 100,000 customers worldwide. Thirdly, the seller can own pallets but rely on a third-party provider to manage them. Lastly, the seller that owns pallets can join a pallet exchange system.

**Table 2: Pallet Costs in Various Materials**

	<b>Hardwood</b>	<b>Softwood</b>	<b>Plastic</b>
<b>Cost (new)</b>	\$9.00	\$6.00	\$60.00
<b>Cost (rebuilt)</b>	\$6.00	N/A	N/A
<b>Estimated Life</b>	25 trips	2 trips	100 trips
<b>Cost per Trip</b>	\$0.36	\$3.00	\$0.60

Source: Minnesota Office of Environmental Assistance.

Note: Prices are for the US in USD and indicative.

The exchange system is probably the most interesting option for many companies. For this reason, hundreds of Canadian companies joined together and established a successful pallet exchange system (see Box 1).

<sup>11</sup> A fifth option consists of a mix of different options.

<sup>12</sup> CHEP (Commonwealth Handling Equipment Pool) from Brambles Group, was developed during WWII in Australia for efficient handling of defense supplies. When the US Army left Australia, they left behind pallets. In 1949, the Australian Government decided to privatize CHEP. The company was sold to Brambles in 1958. Within a few years, CHEP operated the largest pallet pool in the Southern Hemisphere.

**Box 1: A Successful National Pallet Standardization: the Canadian Pallet Council**

The CPC (Canadian Pallet Council) was established to provide low cost, competitive pallet services, including an efficient interchange system for the Canadian industry. Thanks to its leverage, it made the use of one pallet standard, the 48\*40", widespread. This pallet was selected because it is the most widespread in the USA. Today, the CPC is a non-profit organization with almost 1400 members who own and exchange the almost eight million orange pallets in circulation.

This movement started in 1968 when the distribution managers of several major Canadian grocery companies met to establish a standard pallet for interchange. Up until then the pallets in use were a variety of sizes and designs resulting in costly delays and high labor costs. They selected the 48\*40 four-way entry wood pallet. The use of this standard pallet became more and more widespread. In 1977, it was felt necessary to form the Canadian Pallet Council to administer the program - and thus the CPC (Canadian Pallet Council) association was created. Today the CPC includes other pallet services including pallet rental (short and long term), one-way and retrieval programs. Members must repair damaged pallets at approved CPC member locations. Over 60 pallet companies compete to provide these services to CPC user members. CPC membership includes suppliers and manufacturers, distributors and retailers, public warehouses, transport carriers, third party logistic companies, as well as pallet manufacturing, rental, repair and retrieval companies.

Source: Canadian Pallet Council available at [www.cpcpallet.com](http://www.cpcpallet.com)

In LDCs, the availability of outsourcing, renting or exchanging pallets remains limited or even nonexistent. The rental market in Africa does not exist *de facto*: the worldwide leader for renting pallets has service centers only in South Africa, Botswana and Namibia. Lacefield explains: "to be economically feasible, a large number of companies must use the same type of pallet. [...] Essentially, you need an industry where enough players can get together and agree on a standard, and [where] you have enough volume" (2004: 2). In the USA, "[p]allet rental has succeeded in penetrating the consumer packaged-goods market largely because of the widespread acceptance of the Grocery Manufacturers Association standard pallet size of 48 by 40 inches" (2004: 2). The low volumes in Africa hamper the second-hand trade for pallets and the multiplicity of pallet standards reinforces the low volumes deterring the development of this market. Moreover, the trade facilitation problems make rental pallets costly because rental companies charge according to the number of days the pallet is used. When the pallet lies for several weeks in a container in a poorly managed port the rental price becomes excessive especially if the goods exported have a low value added as tends to be the case for the LDCs.

The exchange programs also need a sizeable market with different pallet sizes available. In small markets like those of LDCs, the relative higher cost of rental and exchange

programs obliges rental companies and exchange programs to keep a smaller variety of pallets for which there is a relatively sizeable market. This lack of access to different pallet sizes limits the destination markets where products do not need to be depalletized and repalletized.

Three options are available to LDCs to comply with pallets sizes requirements:

- buy locally recycled imported pallets from developed countries,
- import pallets from either neighboring countries or developed countries,
- export without pallets.

Locally recycled pallets are the cheapest option for an exporter. In several West-African countries, exporters can select this alternative. However, there are shortcomings to this strategy due to the usual poor quality of the pallet. The risk of the loss of goods is much higher. In addition, the pallet may break and consequently goods can be damaged in the container and pallets can be contaminated. For fruit exports, a whole container may be rejected if pallets are contaminated. In addition, the exporter is constrained by the variety of pallets that are brought in with imported products.

Pallet imports from neighboring countries may be a preferable option to mitigate the risks of losses and contamination. There are however two problems associated with this strategy: transport facilitation and tariff duties. In East Africa, it can take three days to import goods from Nairobi to Kampala. Moreover, the COMESA preferential rate for pallets import is 5% but the non-preferential rate amounts to 15% (25% for imports to Rwanda)<sup>13</sup>.

The last solution is to export without pallets. When labor costs are low and handling equipment inexistent or defective, exporters may choose to export without pallets. In this case, cartons are filled manually in the container. The exported volume is also potentially higher. However, this option is not the panacea. Indeed, risk of product loss is higher. At

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<sup>13</sup> Figures for 2003 from UNCTAD TRAINS database provided by Takako Ikezuki.

the border-post between Tanzania and Kenya on the road to Mombasa<sup>14</sup>, customs officials confirm the difference between properly packaged carton bags and carton bags without additional packaging<sup>15</sup>. Carton bags coming from Burundi are usually not palletized and come with no plastic sheets. When the seal is broken at customs to check the cargo, tea may pour out. Rather often, one carton bag or more breaks in the container during the transport. In contrast, tea cartons from Tanzania are usually palletized with plastic sheets and do not suffer losses. The Tea Association in Burundi (OTB) cannot benefit from local high quality packaging in Burundi. The OTB pays a broker company in Mombasa to palletize and to package tea cartons exported overseas. The reason for this is that if the OTB were to palletize tea cartons in Bujumbura, the cartons would need to be depalletized in Mombasa because the packaging from Burundi does not comply with the packaging requirements of the East African Tea Association<sup>16</sup>.

To mitigate the effects of the multiplicity of pallet standards, exporters develop warehousing facilities in large economies to tackle regionally the inefficiencies linked to such multiplicity. Some countries serve as hubs where packaging requirements from importers are met and where warehousing facilities are managed more efficiently thanks to economies of scale. As a result, the packaging (which is the part with greatest value added) is performed in large economies, such as Kenya in the case of East Africa. Consequently, the multiplicity further cripples LDCs.

Packaging quality requirements acquire a growing importance to access developed countries' markets. Indeed, retailers in developed countries can rapidly change of suppliers if their packaging quality requirements are not met (or if the export prices are not competitive). Most exporters from the South find it difficult to charge the retailer for additional packaging costs. Trienekens, Hagen and Willems (2004) explain that, on retail demands from Europe, South African exporters of table grape had to invest in new packaging (pallets, new carton sizes and respect of food-related standards for packaging).

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<sup>14</sup> The auction market for East Africa takes place in this city once a week.

<sup>15</sup> One of the authors of the paper witnessed this difference between properly packaged and not properly packaged tea cartons in Lunga Lunga (Kenya) on May 25, 2004.

<sup>16</sup> Interview with Mr. Callixte, Marketing Manager, OTB on June 29, 2004.

However, “because of strong competition in consumer markets [...], the cost of these innovations cannot be easily included in the product price” (2004:8). South African table grape is under high competitive pressure from Argentina, Brazil and Peru and the market already suffers from oversupply.

## 2.2 The Higher Sensitivity for Low Value Added Exports from LDCs

LDCs’ trade is sensitive to the cost of the multiplicity of pallet sizes because the pallet cost and the depalletizing and repalletizing costs are high relative to the low value added of their exports. Exporters from LDCs cannot afford to spend as much money in transporting the product as exporters from developed countries with higher value added products (see Table 3). Hummels (2004) noticed that the real value of trade in manufactured products grew 22-fold between 1970 and 1999 whereas agricultural and mining goods grew by 10-fold. Although transport costs *ad valorem* have decreased globally, this trend has been more acute for LDCs because of export composition. Packaging costs (pallets and cartons) in Uganda can amount to 50% of the product value for the export of a pallet of bananas<sup>17</sup>.

**Table 3: Value of One Container<sup>18</sup> Loaded with Various Goods**  
(in USD)

Type of Goods	Value
Bananas	8000
Textile	70000
Electronics (apparels)	100000

This factor limit the quality of the pallets that exporters from LDCs can afford and limit also the number of times that an exporter can afford a product repalletization to meet the different criteria of the destination markets. As a result, the multiplicity of pallet size can reduce LDCs’ market access and can cause a lower share of palletization.

<sup>17</sup> Interview with Amit Shah, May 27, 2004. He is the executive director of Freight in Time, the logistical branch of a major fruits and vegetables exporter in Kenya.

<sup>18</sup> The price may vary considerably. This figure gives an indication of the ratio between different types of goods. Prices are given for a 40-feet container.

To summarize, exporters from LDCs face two important obstacles: costly access to quality pallets and low value added products. They have to pay a relatively higher cost for imported quality pallets, use poor quality pallets running the risk of the product not being accepted by the retailer, or take the risk of product spoilage without pallets.

### **3. Conclusion and Policy Implications**

The pallet example highlights the inefficiencies created by the multiplicity of standards. Five main lessons can be derived from this study and extended to other cases of standards multiplicity:

- The multiplicity of pallet sizes increases trade costs.
- The multiplicity poses a particular challenge for LDCs because of high compliance costs of the standards and the lower value added of exports from LDCs.
- The ideal solution to the problem of standards multiplicity would be a worldwide harmonization because it would considerably reduce countries' transaction costs. However, in the case of the pallets, countries' reluctance to abandon different pallets sizes makes standardization into one pallet size virtually impossible.
- The private sector seems able to provide only a second-best solution: standardization at the sectoral level, where manufacturers and retailers agree on a standard for a sector in as many regions as possible.
- The multiplicity of standards for one product can spread to other products in the production chain: in the case of pallets, it facilitated greater variety in boxes and might lead to multiplicity in containers.

In cases such as pallets, international cooperation is required to mitigate the inefficiencies resulting from pallet multiplicity and should follow two complementary approaches: a top-down and a bottom-up.<sup>19</sup>

The top-down approach involves the cooperation of governments at the international level. Two solutions can be envisioned: the first is the conversion of the ISO pallet



standard into a compulsory international technical regulation. This is by no means an easy strategy. It would require the intervention of a supranational authority with sufficient enforcement power. However, the most likely candidate, the WTO Technical Barrier to Trade (TBT) committee does not set international technical regulations; it only sets the principles that technical regulations must satisfy. The second solution is for governments to promote the ISO-recognized standard. Such an approach could be complemented with an international compensatory mechanism, where countries less affected by the readjustment to the ISO standard would provide assistance to those most affected. Government's promotion of the ISO standard is the most promising solution. Indeed, ministries or state-owned enterprises can influence the market and create positive incentives. The US Department of Defense illustrates this point with the new RFID technology (see Box 2).

**Box 2: The US Department of Defense Constrains Suppliers to Adopt ISO-recognized RFID Technology**

RFID (Radio Frequency Identification)<sup>20</sup> is a technology that is being developed for assets tracking, access applications, and toll collection to reduce labor and stocks costs. By capturing data without manual scanning, the Department of Defense (DoD) expects to reduce significantly the number of people needed to handle goods. By improving the tracking of goods, safety stocks can be reduced.

DoD has involved the private sector in setting a common standard to widespread the use of this new technology. In October 2003, the DoD started to ask its 23,000 suppliers to use RFID tags to help track items. By 2010, all pallets and cases shipped to DoD's large depots will must have RFID tags. DoD embraced the ISO draft standard for RFID technology. Following this decision, many suppliers adopted the draft ISO version. Wal-Mart (and its 43,000 suppliers) is the main representative of the seemingly second camp. Aware of the importance of standardization to develop the use of RFID for pallets, the DoD and Wal-Mart started to cooperate. Without common data-formatting and tag specifications, a supplier would have to tag pallets differently to Wal-Mart than those destined for the military. An industry trade association for RFID was established and, in June 2004, a RFID expert group was constituted. Wal-Mart and the DoD are included in this group. Foreign companies may also join this association: two Chinese companies are members of this association.

DoD's role in the adoption of a universal RFID standard is critical. DoD has involved the private sector in setting a common standard. This cooperation is rather unusual. Dignan (2004) noticed: "there's not a lot of precedent for public and private cooperation on setting early standards for a new technology".

The bottom-up approach involves the cooperation between countries' private sectors aiming at a worldwide sectoral standardization. This approach has already been followed

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<sup>19</sup> This part derives mainly from discussions with Rick Le Blanc.

by several sectors such as the electronics or brewery sectors, which have adopted a “sectoral pallet” used worldwide. The electronics industry has developed two international standard pallet sizes used to ship computers and other electronics: the 1200\*1000 in the USA and the 1200\*800 in Europe (Brindley 2002:3).

The bottom-up approach consists of the following steps: first, the representatives of a sector review the pallet standards used in that sector; second they select the most appropriate standard and third they devise incentives for professionals of that sector to adopt the “sectoral standard”. The sector could subsidize the purchase of this sectoral standard, for instance by providing a rebate per new product purchased. If all sectors followed this bottom-up approach, there would be a migration toward a set of international standards, and harmonization of pallet standards within sectors would be achieved.

The role that LDCs could play in the top-down and bottom-up strategies is very limited since LDCs are generally standard takers and have a limited leverage in international harmonization efforts. What can LDCs do in the meantime to lessen the costs of the multiplicity of pallet standards?

LDCs should facilitate the development of the purchase, rental and exchange pallet market in their economies to improve their access to pallets and lower their cost. With this end in view, LDCs could contribute in four directions. First, implementing trade facilitation measures would help develop these markets. Indeed, as road, customs and ports infrastructure are improved, transport time would be reduced that would result in lower rental pallet costs. Reducing pallet costs would facilitate the palletization of products and ultimately increase the demand for a pallet market. Second, LDCs should also eliminate tariffs and illegitimate non-trade barriers for pallets since this elimination would reduce costs and improve access to pallets. For instance, tariffs on pallets between neighboring LDCs in Africa can be as high as 15 percent. Protectionist policies lead to an

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<sup>20</sup> This technology consists of an antenna with a transceiver and a transponder. When a RFID tag passes the electromagnetic zone, the reader decodes the data encoded in the tag’s integrated circuit and the data is

inefficient use of pallets. Third, regional integration for LDCs would contribute to greater intra-regional trade in pallets and would help producers reap greater economies of scale, lower pallet price and upgrade pallet quality.

As Le Blanc points out<sup>21</sup>, pallet manufacturing is typically a basic technology enterprise with a low minimum efficiency scale. Therefore, there is the potential to strengthen pallet manufacturing through appropriate incentives in LDCs with wood availability. This has been the case for instance in some South American countries. Several saw mills in Latin America produce world-class pallet components used for the US pallet industry<sup>22</sup>. Capacity-building to transfer best practices can become a critical contribution to develop pallet manufacturing in LDCs as well as the above-mentioned incentives.

LDCs should refrain from setting their own pallet standards, which would only contribute to a greater multiplicity of standards. Governments should not discourage the use of pallet standards used in foreign markets. They should grant domestic pallet producers enough flexibility to satisfy foreign markets' pallet standards to have greater market access and reduce transport costs.

In this field, the World Bank's strategy should be divided in two directions: to develop awareness of costs related to the multiplicity of standards and to support actively harmonization at the global level (within ISO) and at the regional level (within regional cooperation agreements).

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passed to the host computer for processing.

<sup>21</sup> E-mail exchanges in June 2004.

<sup>22</sup> Interview with Ian Carter, North American Industrial Ltd.

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